

CLAIMS

What is claimed is:

1. A system for cancelling noise radiation from a vibrating
5 structure, said system comprising:

a vibrating structure, said vibrating structure having a
sound radiating area; and

a radiation-cancelling device, said radiation-cancelling
device having a sound radiating area, wherein said radiation-
10 cancelling device comprises a spring-mass system cooperatively
attached to said vibrating structure and wherein, further,

the motion of said vibrating structure provides the
driving frequency for oscillation of said spring-mass system
in said radiation-cancelling device; and

said radiation-cancelling device is designed so that
the natural frequency of said spring-mass system in said
radiation-cancelling device is lower than the vibration
frequency of said vibrating structure.

2. The system of claim 1, wherein the sound radiating area of
said radiation-cancelling device is smaller than the sound
radiating area of said vibrating structure.

3. The system of claim 2, wherein the sound radiating area of
25 said radiation-cancelling device is less than one twentieth the
sound radiating area of said vibrating structure.

4. The system of claim 1, wherein the sound radiating area of
said radiation-cancelling device is larger than the sound
30 radiating area of said vibrating structure.

5. The system of claim 1, wherein said vibrating structure is a
transformer.

6. The system of claim 1, wherein said vibrating structure is a train wheel.

7. The system of claim 1, wherein the spring-mass system of said radiation-cancelling device is in the form of an inverted metal cup.

8. A method for cancelling noise radiation from a vibrating structure, said method comprising the steps of:

providing a vibrating structure in need of quieting, said vibrating structure having a sound radiating area; and

cooperatively attaching to said vibrating structure a radiation-cancelling device, said radiation-cancelling device having a sound radiating area, wherein said radiation-cancelling device comprises a spring-mass system and wherein, further,

the motion of said vibrating structure provides the driving frequency for oscillation of said spring-mass system in said radiation-cancelling device; and

said radiation-cancelling device is designed so that the natural frequency of said spring-mass system in said radiation-cancelling device is lower than the vibration frequency of said vibrating structure,

wherein, when said vibrating structure vibrates at said vibration frequency, noise radiating from said sound radiating area of said vibrating structure is cancelled by noise radiating from said sound radiating area of said radiation-cancelling device.

9. The method of claim 8, wherein the sound radiating area of said radiation-cancelling device is smaller than the sound radiating area of said vibrating structure.

10. The method of claim 9, wherein the sound radiating area of said radiation-cancelling device is less than one twentieth the sound radiating area of said vibrating structure.

5 11. The method of claim 9, wherein the sound radiating area of said radiation-cancelling device is larger than the sound radiating area of said vibrating structure.

10 12. The method of claim 8, wherein said vibrating structure is a transformer.

13. The method of claim 8, wherein said vibrating structure is a train wheel.

15 14. The method of claim 8, wherein the spring-mass system of said radiation-cancelling device is in the form of an inverted metal cup.